

Towards virtual governance architecture – a perspective on information technology as a transformer of public institutions and governments

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Abstract: The paper contributes to further the understanding of potential impacts e-Government initiatives will have on the state and its society. On the basis of three European case studies, we have examined the correlation of information technology and State transformation, which we present and discuss in this paper. We are about to conceptualize this correlation as virtual governance architecture, which relies on a standardized reference model. Our paper is prospective in nature and should be seen as a work in progress. It outlines our estimation of information technology as a new driver of e-governance conceptualization.

1. Objectives

Technology has been and so far still is a major reason for organizations to transform their business model. Organizations are forced to change due to fundamental developments in technology. [1] Within the past years, internet evolved as the source for new value creation and deletion of obsolete business models and organizational structures.

The term creative destruction was often used in research to describe the influence of internet technology on society and business. [2] The digitalization of the public sector is one of the major goals of research on the interaction between information and communication technology (ICT) and the public sector. So far, ICT - or more precisely information technology - is mainly implemented to change, improve and simplify processes in public administrations and government.

This paper contributes a new perspective on the interaction of ICT and State transformation. In the paper, we aim at presenting and discussing our fresh approach of *virtual governance architecture*. It is mainly based on the assumption of not consider the question of how the public sector can ‘do the things right’ by means of ICT. Moreover, we consider the public sector’s effectiveness, which is how to ‘do the right things’ by applying ICT. This paper aims at drawing a visionary picture of *virtual governance architecture*, which we consider as the future model to describe the impact of ICT on State transformation and to estimate prospective forms of governance for public administration and governments.

After briefly summarizing our research methodology in section 2, we roughly describe the underlying method to describe and examine virtual governance architecture in section 3. In section 4, we derive our conceptualization of virtual governance architecture from State transformation. The paper highlights the results of our case study research in section 5, before they will be examined in section 6.

2. Research Methodology

The paper is based on three European case studies in the domain of e-Government. We have chosen these cases to be particularly illustrative of the three main dimensions – i.e., e-Service-Delivery, e-Regulation and e-Policy-Making – of evolving e-Governance practice and theory. By analysing the cases from a comprehensive theoretical framework, we examined how (ICT) impacts State transformation. In the paper, we briefly outline the key findings of each case and describe the correlation of information technology and the modernization of the States main functions.

To describe and conceptualize such correlation, we have developed a reference model, which we call *virtual governance architecture*. We have adopted the patterns of Open Distributed Processing (ODP) in order to describe the reference model. Basically we introduced two elements, which are *object modelling* and *viewpoint specification*. [3] With the model, we are able to describe heterogeneous systems of ‘State’ where public administration and governments interact with ICT. Furthermore, we reduce the ‘State’ to a systemic model of interaction between public and private actors, which interfered by ICT.

3. Technology description

In the following section we outline the methodology we have developed to describe and evaluate virtual governance architecture.

3.1 Object modelling concept

Object modelling aims at implementing a design practice, which provides rigorous definitions of a minimum of concepts (action, object, interaction and interface) that are applicable from all point of views. [3]

1. Objects

The specification of the system ‘State’ is expressed in terms of *objects*. It is the representation of an entity that contains information and that offers services. The system as whole is composed of interacting objects. An object can be characterized by encapsulation, abstraction and behaviour.

- **ENCAPSULATION:** An object’s information can only be made accessible through interaction at the *interfaces* supported by the object. A change in the *state* of an object can only occur as a result of an *internal action* within the object or as a result of an interaction with its environment.
- **ABSTRACTION:** It implies that the internal details of an object are hidden from other objects. Consequently, different services can be implemented in different ways using different mechanisms.

As an example, actors in the public (e.g. government) and private sector (e.g. company or citizen) can be characterized as objects. An object can also be the private sector as a whole.

2. Interfaces and interaction points

An interface represents a part of the object's behaviour related to a particular subset of its possible interactions. An interface is identified with a set of interactions in which the object can participate. An object can interact with itself and can have various interfaces. An interface exists at an interaction point.

The right to participate in the public policy-making processes can be regarded as an interface. The citizen, as an object in the system 'State' has a set of interaction possibilities in the voting process (e.g. voting by post, voting by internet etc.) The name of the interface could be '*participation in policy-making*'.

3. Behaviour and State

The behaviour of an object is a collection of actions that the object may take part in and the set of constraints when those actions occur. When we regard a company as the object, its behaviours might be for example '*produce goods*', '*pay taxes*' etc.

The state of an object is the condition of the object at a given instant that determines the potential future sequences of actions that the object may be involved in. Coming back to the companies as an object of the system 'State', a potential state of the object might be '*taking over federal responsibility*'.

3.2 *Specifications and structuring concepts*

In the following section we briefly outline specification concepts, which are required to systemically examine the system 'State'.

1. Composition/decomposition and behavioural compatibility

Composition and decomposition are used to organize the specifications of the system 'State' as a set of specifications. It allows decomposing the complex system 'State' into specifications of a number of simpler objects, which may also be decomposed at a lower level of abstraction. Basically this means, that the public sector, as the set of for example society and industry, is a composite object, which is composed of the two sub-objects society and industry.

An object is behavioural compatible with another object in an environment if the first object can replace the second, without the environment being able to detect any difference.

2. Type, class, templates and roles

A *type* is a set of properties to a collection of things (objects, interfaces). For example '*is public*' is a type. Types implicitly classify things into sets of known classes, where the class is the collection of things with the properties prescribed by a type. The concept of type and class leads to the definition of type/subtype and class/subclass hierarchies.

A *template* describes a collection of things (objects, interfaces) in sufficient detail for a new thing to be instantiated from it. A *template type* is a predicate defined in a template and is satisfied by all instantiations from the template.

A *role* defines, in a template of a composite object, the behaviour to be associated with one of the component objects. When an object is viewed in terms of roles, only a named subset of its actions is of interest, and other actions are abstracted away, possible to other roles.

3. Groups and domains

A *group* is a set of objects grouped together for structural reasons or because the behaviours of the objects have common features. A *domain* is a particular form of group in which a particular aspect of the behaviour of objects in the group is controlled by the same authority.

3.3 Architectural framework - viewpoints

In our reference model, we use viewpoints, which are sub-divisions of the specification of the complete system ‘State’. We differentiate five viewpoints (VP) on the system ‘State’ and its environment.

- **ENTERPRISE:** The VP focuses purpose, scope and policies of the system.
- **INFORMATION:** The VP focuses on the semantics of the information and the information processing which is performed in the system.
- **COMPUTATIONAL:** The VP enables distribution through functional decomposition of the system into objects which interact at interfaces.
- **ENGINEERING:** The VP focuses on the mechanisms and functions required to support distributed interaction between objects in the system.
- **TECHNOLOGY:** The VP focuses on the choice of technology in the system.

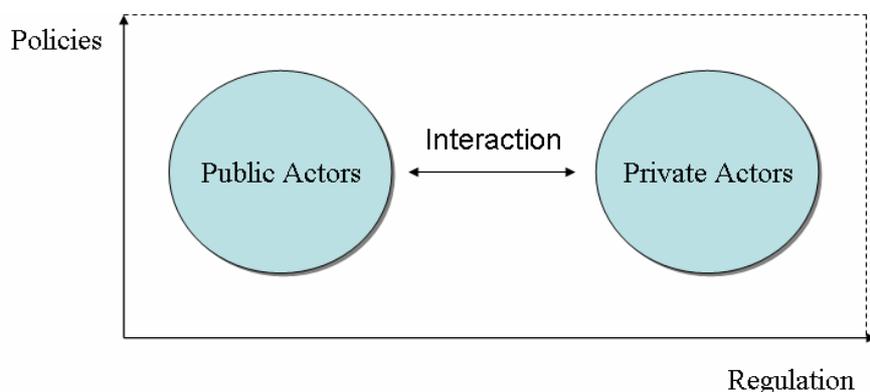
With the five different viewpoints we can bring together every particular information which is relevant to a certain area of interest within the complex system ‘State’.

4. From government to virtual governance architecture

The next section of the paper derives our conceptualization of virtual governance architecture from the term *State* and *State transformation*. We consider the State as an institutionalized representative of government and public administration.

4.1 What is the State?

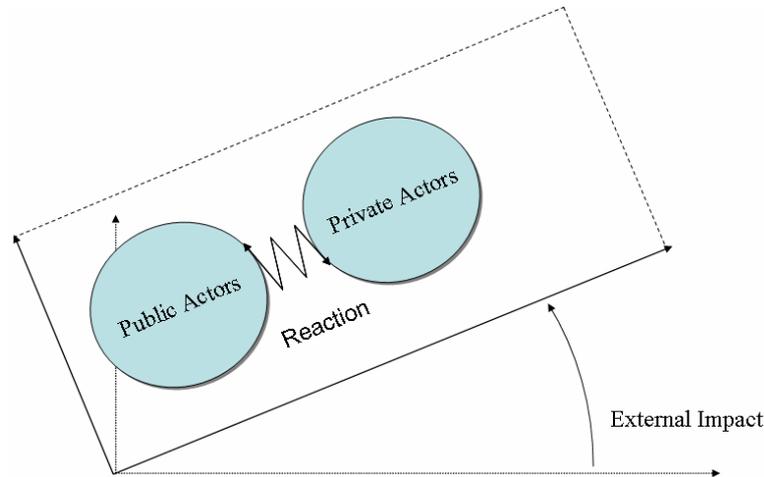
What is the State? Uncoupled from the physical existing institutions (authorities, departments), the State is a set of policy-systems, regulatory systems and actors in those systems. Basically, the State can be defined as system, where public and private actors interact in a two dimensional space.



The public actors, such as authorities and administrations, interact with private actors, such as citizens or companies, in case of taxation or violation of law. Due to state-run rules and regulations, the private actors are themselves obliged to interact with public actors. The system as a whole represents the State.

4.2 The process of State transformation

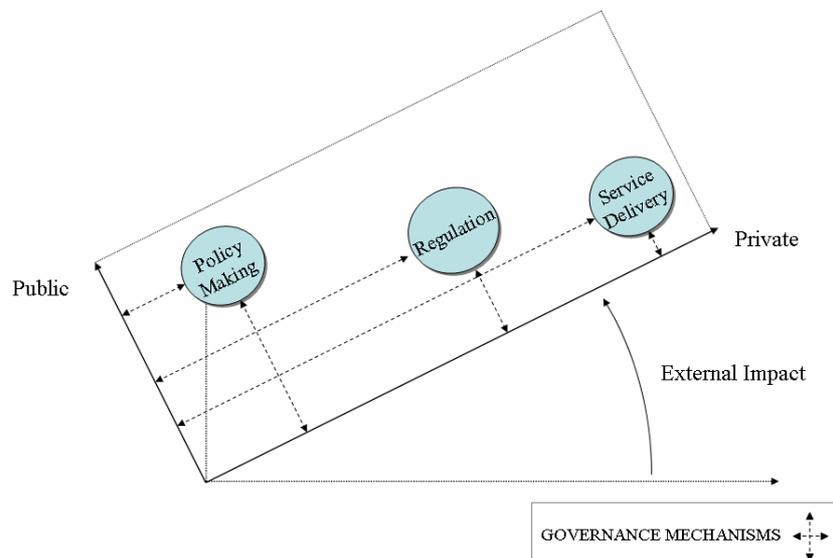
In the last paragraph, we have conceptualized the State on an abstract level. The following section focuses the question: *What is State transformation?* The way the State is working is fundamentally changed through an external impact. The traditional understanding of a strict separation between public and private actors in the framework of rigid policy-systems is challenged.



The impact on the system as a whole leads to a reaction between public and private actors. Private actors are penetrating former public functions and take over responsibility in order to control the service provision. The public actors shift to the role of performance controlling and management. Distinctions between instantiated policy-systems and regulatory authorities are blurring, while new forms of regulatory mechanisms and policy-making come up.

4.3 The modernization of State as the result of transformation

At the end of the transformation process, we see a clear modernization of the State's main three functions with the private actors taking actively control over them. The two dimensional space of the system *State* is no more directly dependent on the surrounding policy and regulatory system. The new factor of influence is the ratio of public and private control within the State functions. We see new governance mechanisms, which will take over the regulatory instance in the system. Policy-making is still a public sector owned function, although the private sector has increased its level of influence.



According to our understanding of the transformation process, the system we call State is more *virtual* than *physically* existent. There is no tangible object we can identify to be the 'State', rather it is the system of functions, mechanisms and objects as a whole. That is why we call the system 'State' a *virtual governance architecture*.

5. Results

In the first paragraph of the fifth section, we describe the outcome of our case study analysis conducted with three different European e-Governance initiatives. The second paragraph arrives at the conclusion how ICT, in particular information technology, drives the transformation of State.

5.1 E-Governance initiatives and the modernization of State: a brief summary

1. The canton of Zurich - a case study on e-Service-delivery

The canton of Zurich implemented multiple web-technology based services within a cantonal portal. The initiative focused transaction based services between government and different client groups (such as citizens, industry and municipalities) The pallet of e-Services was enormous. [4] In summary, the following conclusions could be drawn.

- **SUBSTITUTION&MIRRORING:** *The portal significantly facilitates the navigation throughout the cantonal administration and fosters an efficient interaction with the 'clients'.*
- **SERVICE DELIVERY:** *The portal improves the understanding and participation of citizens regarding policy making and administrative procedures. Internet affine 'clients' prefer online interaction with administration and government.*

2. The Flemish community - a case study on the attempt of electronic deregulation

In 1998, the Ministry of the Flemish Community launched a change management initiative in order to simplify administrative procedures for investors seeking to obtain licenses or applying for regional investments. During the following years, a Government-to-Business portal was put online and served as an information and interaction-based platform. The Flemish Community was able to improve the relation between investors and government. However, the change project as a whole was indirectly stopped.

- **FUNCTION&TECHNOLOGY:** *A project in e-Regulation goes far beyond the digitalisation of the existing; it is a comprehensive change management approach.*

The digitalization of government was on the short-run sufficient to satisfy the needs of 'clients'. However, the target 'deregulation' required more than just that.

- **LEVEL&ACTORS:** *Changes in governments have a very critical influence on the sponsorship and progress of an e-Regulation project.*

In 1999, the newly elected government did not accept the ongoing actions. Discordance and uncertainty about future concepts of deregulation finally hindered the project to be processed clearly

Handling *State transformation* means managing multi-level complexities. The e-Regulation project demonstrated that it requires the exploitation of technology as well as a strong commitment of government to discover new forms of public-private collaboration.

3. The canton of Geneva - a case study on electronic policy-making

In 2001, the canton of Geneva, Switzerland launched and tested an e-Voting project with 450 web users of all ages. The project went 'live' in may 2002 within the framework of a

real voting situation with 16.000 school attendees. In 2003, two small scale ballots were processed successfully in villages with 1200 and 2500 registered voters.[5]

- **ACTOR&LEVEL:** *Electronic policy making is a very sensitive challenge. It has to be exploited carefully by bringing together public administration, legislation and the private sector.*

Prior to implementation, local, regional and even national legislations were slightly adjusted in order to enable a successful implementation of e-Voting. The e-Voting system was built in a public-private partnership. Its integration's main requirement was sustainability and the target of setting up a custom-made solution.

- **TECHNOLOGY:** *Information technology has an increasing impact on the influence of society in policy-making processes.*

The e-Voting system drives the evolution of an information society in the canton of Geneva. Due to technological and procedural improvements, during the last eight years the voter turnout increased by 20 percent. [6]

- **SUBSTITUTION&MIRRORING:** *Transition to electronic policy making needs a gradual approach to be implemented in order to gain acceptance and sustain commitment.*

Information technology influences the perception of the policy-making processes. Furthermore, the e-Voting system confirmed that technology positively impacts the way, society interacts with the current policy-systems. [5]

5.2 *Information technology as a key driver of State transformation*

Information technology has been and so far still is a major reason for organizations to transform their business model. The research term *creative destruction* describes the impact of information technology on the system 'State'. As the case studies have shown, the traditional, institutional understanding of the State is continuously being destroyed, while new, in our eyes more virtual, *architectures of governance* emerge (VGA). Basically, we perceive four major steps of information technology induced transformation.

- **SUBSTITUTION:** At first, the *types of action* within *interfaces* of the objects (public/private) are being substituted. The object's *behaviour* remains as it is; only the *type* of actions its interface is composed of becomes digital. Substantially, procedures between public and private actors in the State remain as they are; only their appearance becomes digital
- **MIRRORING:** Second, information technology is being exploited by public actors. While the way of processing is being improved, the interaction between public and private as a whole remains the same. The actions within an objects interface are mirrored and improved, while the interface as a whole remains the same.
- **GENERATION:** In the third step, the transformation starts becoming really obvious. Due to emerging technology standards, new services are being developed. In terms of VGA, new object interfaces emerge.
- **MONITORING:** The final stage of transformation is reached, when the State is simply monitoring the systems functioning. The State has outsourced functions, which can mostly be processed by the private sector. To use the terminology of VGA, the composition of the system 'State'

has changed. Some objects have disappeared, some objects have completely changed behaviour and interface, while some new objects and interfaces have emerged.

6. Business benefits and conclusions

One of the major insights we gained in the case study analysis is the fact, that State transformation is in a very early stage. Although much is written on the influence of information and communication technologies on public institutions and government, at the moment it is only information technology which drives the evolution. Ongoing e-Government initiatives are proofing ICT's high potential to enable the emergence of new business models at the public-private sector interface. However, business has to keep in mind that ICT is only one driver of State transformation.

The virtual governance architecture (VGA) approach enables the analyst to examine ongoing transformation processes and to conclude eventual development tendencies of the State in the future. The VGA approach abstracts ongoing State transformation on a systemic level, which assists in understanding the complexities and influences of ICT on the modernization of State.

The three core functions of State, namely service-delivery, regulation and policy-making, are mainly affected by the transformation process. Since information technology highly impacts those functions, we consider information technology as one of the key drivers of State transformation. This is what we call e-Governance and its conceptualization is our approach of virtual governance architecture. Within our prospective activities, we aim at further investigating the practicability of VGA in order to actively drive the creation of new forms of governance for government and administration by means of ICT.

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